FEDERAL BUREAU OF PRISONS
CLINICAL PRACTICE GUIDELINES FOR DIABETES
SEPTEMBER 2002

PURPOSE

The Federal Bureau of Prisons Clinical Practice Guidelines for Diabetes provide recommendations for the medical management of Federal inmates with diabetes mellitus.

REFERENCES

American Diabetes Association: Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, *Diabetes Care*, 2002;25:S5-S20.

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*These are blank pages as place holders for separate files which cannot be inserted into the electronic document. These separate files should be printed and inserted at the appropriate place holder into the printed guidelines.

DEFINITIONS

Casual Plasma Glucose (CPG) or **Randomly Measured Glucose (RMG)** is a blood glucose measured any time of the day without regard to the time since the last meal.

Clinician is a physician or midlevel provider.

Diabetes mellitus is "a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both."

Fasting Plasma Glucose (FPG) is a blood glucose that is obtained after no caloric intake for at least eight hours. (Plasma glucose is obtained by venipuncture; whole blood glucose is most commonly obtained by fingerstick using a hand-held glucose meter.)

HbA_{1c} or A1C (glycated hemoglobin) reflects the mean glycemia over the preceding two to three months. Values are free of day to day glucose fluctuations and are unaffected by exercise or recent food ingestion. The interpretation of this test depends on the red blood cells having a normal life span, the average being 120 days. Persons with hemolytic disease or other conditions with a shortened red blood cell survival exhibit a significant reduction in A1C. A1C can still be used to monitor inmates with these conditions but the values must be compared with previous values from the same inmate, not from published reference values. High A1C levels have been reported in iron deficiency anemia, probably due to the high proportion of old circulating erythrocytes.

Gestational Diabetes Mellitus (GDM) is any degree of glucose intolerance identified during pregnancy.

Impaired Glucose Tolerance (IGT) and **Impaired Fasting Glucose (IFG)** are intermediate stages between normal glucose homeostasis and diabetes. Persons with IGT and IFG are at risk for future diabetes and cardiovascular disease.

Lower Extremity Amputation Prevention Program (LEAP) is a screening tool for peripheral neuropathy designed by the Hansen's Disease Center, that uses a 10 gram monofilament to assess sensation of the soles of the feet.

Oral Glucose Tolerance Test (OGTT) is a supplemental test for diagnosing diabetes in certain patients that involves an

overnight fast after consuming an unrestricted diet for three days, then an oral glucose load, followed by serial measurements of plasma glucose concentrations.

Type 1 diabetes is caused by a deficiency of insulin secretion due to pancreatic islet β-cell destruction that is frequently associated with pancreatic autoantibodies. Individuals with type 1 diabetes are usually dependent on exogenous insulin and are at risk for ketoacidosis.

Type 2 diabetes is caused by insulin resistance with a relative, but not absolute deficiency of insulin. The etiology of type 2 diabetes is uncertain. Individuals with type 2 diabetes are not prone to ketoacidosis and may be asymptomatic.

PROCEDURES

1. CLASSIFICATION

Diabetes is classified into one of the following four general categories:

Type 1 diabetes is a disease resulting from absolute insulin deficiency usually caused by autoimmune destruction of pancreatic islet cells. Type 1 diabetes can occur at any age. The initial clinical presentation may be ketoacidosis with an acute illness or a more gradual presentation with symptoms of hyperglycemia. Other autoimmune disorders may also be present such as Addison's disease, thyroiditis, and pernicious anemia.

A small subset of patients with type 1 diabetes have a nonimmune-mediated disease process with a waxing and waning clinical course. This form of type 1 diabetes is strongly inherited and most commonly affects persons of African and Asian descent.

Type 2 diabetes is a disease of uncertain etiology resulting from a relative, but not absolute, insulin deficiency with an underlying insulin resistance. Type 2 diabetes increases with obesity, age, and physical inactivity. Patients with type 2 diabetes are not prone to ketoacidosis, frequently do not require insulin, and may be asymptomatic, despite hyperglycemia for many years. They frequently have characteristics associated with insulin resistance that include abdominal obesity, hypertension, lipid abnormalities, atherosclerosis, and hyperuricemia.

Gestational diabetes (GDM) is diabetes or any degree of glucose

intolerance diagnosed during pregnancy.

Other causes of diabetes that are not classified as either type 1 or 2 diabetes include genetic defects of islet cell function, genetic defects in insulin action, endocrinopathies such as Cushing's disease or syndrome, drug- or chemical-induced hyperglycemia, infections, and insults to the pancreas from a variety of causes such as pancreatic cancer, cystic fibrosis, trauma, and pancreatitis.

2. SCREENING

The preferred method of screening for diabetes is the measurement of a fasting blood glucose (FBG). Elevated results should be repeated on a subsequent day to confirm the diagnosis. The oral glucose tolerance test (OGTT) is not recommended for routine screening, but is used as a supplemental diagnostic test for certain patients. The measurement of A1C levels should not be used to diagnose diabetes.

Screening for diabetes should be considered for the following inmates:

Symptomatic inmates: Inmates with symptoms of hyperglycemia, complications of diabetes, or clinical presentations that include diabetes in the differential diagnosis should be evaluated for diabetes.

Asymptomatic older adults: Sentenced inmates over age 50 who request and receive routine physical examinations in accordance with BOP policy should be offered screening for diabetes.

Asymptomatic inmates with risk factors: Sentenced inmates with the following risk factors regardless of age warrant screening for diabetes:

- First degree relative with diabetes

- Inmates of certain ethnicities (African Americans, Hispanic Americans, Asian Americans, Pacific Islanders and Native Americans)

- Obesity

- Hypertension

- Dyslipidemia

- Previously identified impaired glucose tolerance or impaired fasting glucose

- History of gestational diabetes or delivery of a baby weighing more than nine pounds

Pretrial inmates: Nonsentenced inmates should be screened on a case by case basis depending on their medical history and clinical presentation.

Pregnant inmates: All pregnant inmates should receive a risk assessment during their first prenatal visit and should be screened accordingly.

- Low-risk pregnant inmates do not require screening for diabetes (Low-risk is defined as age < 25 years, normal body weight, no first-degree relative with diabetes, no history of poor obstetrical outcomes, and not members of an ethnic/racial group with a high prevalence of diabetes, such as Hispanic Americans, Native Americans, Asian Americans, African Americans, or Pacific Islanders).

- Pregnant inmates at average risk (between low and high risk) should be screened with a FBG. If the FBG is nondiagnostic for diabetes, an OGTT should be performed between 24 and 28 weeks of gestation.

- Pregnant inmates at high risk (marked obesity, prior history of GDM, glycosuria, or a first-degree relative with diabetes) should be screened with a FBG as soon as possible after the initial risk assessment. If the FBG is nondiagnostic for diabetes, an OGTT should be performed between 24 and 28 weeks of gestation.

Inmates with IFG or IGT: Inmates with impaired glucose homeostasis are at increased risk of developing diabetes. Approximately one third of patients with IGT or IFG will develop diabetes within five years. Annual screening of these patients with a FBG is recommended.

3. DIAGNOSIS

Glucose homeostasis is defined by the following categories:

Normal: **FBG < 110 mg/dL**; OR OGTT 2 hour postload glucose < 140 mg/dL.

Impaired: **FBG ≥ 110 mg/dL and < 126 mg/dL**; OR OGTT 2 hour

postload glucose ≥ 140 mg/dL and < 200 mg/dL.

Diabetes: **FBG ≥ 126 mg/dL**; OR OGTT 2 hour plasma glucose ≥ 200 mg/dL; OR symptoms of diabetes (polyuria, polydipsia, unexplained weight loss) plus a casual plasma glucose concentration ≥ 200 mg/dL

Gestational diabetes: **FBG of ≥ 126 mg/dL or CBG ≥ 200 mg/dL**; OR glucose intolerance as determined by an abnormal OGTT using specific criteria for diagnosing GDM.

A definitive diagnosis of GDM requires administration of a 100 gram oral glucose load in the morning after an overnight fast of 8 to 14 hours, with the patient on an unrestricted diet and normal physical activity for the preceding three days. The patient must remain seated during the test and not smoke. Diagnosis requires that two or more of the following plasma glucose concentrations be met or exceeded: fasting (95 mg/dL); 1 hour (180 mg/dL); 2 hours (155 mg/dL); or 3 hours (140 mg/dL).

4. BASELINE EVALUATION

Medical history: A comprehensive medical history should be taken for all inmates diagnosed with diabetes by the evaluating clinician. The history should confirm the laboratory diagnosis of diabetes and include a review of previous treatment and an evaluation of past and present glycemic control. Chronic complications of diabetes should be assessed. The medical history for diabetic patients includes the following elements:

- Assessment of eating patterns, nutritional status, weight status, and physical exercise

- Determination of risk factors for atherosclerosis such as smoking, hypertension, obesity, dyslipidemia, and family history

- Symptom review, results of laboratory tests, and special examination results related to the diagnosis of diabetes

- Determination of prior A1C results

- Review of current treatments, including medications, food selections, and results of glucose monitoring

- Assessment of the frequency, severity, and causes of acute complications such as diabetic ketosis and hypoglycemia

- Review of prior or current infections, particularly involving

the skin, feet, dentition, and genitourinary system

- Assessment of symptoms and treatment of chronic complications associated with diabetes such as retinopathy, nephropathy, neuropathy, genitourinary function, gastrointestinal function, cardiovascular, peripheral vascular, and cerebrovascular problems, skin and foot ulcers

- Review of concurrent medications that may affect blood glucose levels or precipitate diabetes such as HIV protease inhibitors, atypical antipsychotic agents, pentamidine, and high dose thiazide diuretics.

- For female patients, a gestational history to include hyperglycemia, delivery of an infant weighing more than 9 lbs., toxemia, stillbirth, polyhydramnios or other complicated pregnancy

- Discussion of lifestyle, psychosocial and educational factors that might influence the management of diabetes (include alcohol and drug use history)

Immunizations: The inmate's previous immunizations should be documented. Influenza vaccine is indicated annually for diabetic inmates, unless medically contraindicated. Pneumococcal vaccine is indicated at the time of diagnosis, unless medically contraindicated or previously administered. The inmate's tuberculin skin test history should be reviewed, including the treatment of latent TB infection when warranted.

Physical examination: Inmates diagnosed with diabetes should have a baseline examination conducted by a clinician that includes an examination of the eyes, heart, kidneys, feet, and vascular and neurologic systems to document complications of diabetes. Type 1 diabetics should have a thyroid examination and should be assessed for signs of hypothyroidism and hyperthyroidism. The clinician should be alert for signs of diseases that cause secondary diabetes such as a bronzed skin color with hemochromatosis, GI malignancy (acanthosis nigricans), and endocrine disorders such as acromegaly, Addison's disease, pheochromocytoma, and Cushing's syndrome. The baseline physical examination should include the following:

- Vital signs, including height and weight measurement, and orthostatic blood pressure measurements to screen for autonomic neuropathy

- Fundoscopic examination, preferably with pupillary dilation

(strongly consider scheduling a baseline optometry or ophthalmology examination, since many newly diagnosed diabetics have actually had ocular disease for several years)

- Oral examination

- Thyroid palpation

- Cardiac examination and evaluation of pulses by palpation and auscultation

- Abdominal examination to rule out hepatomegaly as well as bruits or enlargement of the abdominal aorta

- Hand and finger examination

- Foot examination for infections, skin breakdown, and testing for neuropathy

- Skin examination including insulin injection sites

- Neurologic examination

Dental examination: The dental examination should be performed by a dentist and include a hard and soft tissue examination, a periodontal assessment, and follow-up evaluations as clinically indicated.

Laboratory evaluations: The baseline laboratory evaluation should include the following routine tests and other studies as clinically indicated:

- Fasting plasma glucose, if not already performed

- Hemoglobin A1C

- Fasting lipid profile to include total cholesterol, high-density lipoprotein cholesterol (HDL), triglycerides, and low-density lipoprotein cholesterol (LDL)

- Serum creatinine

- Urinalysis to include glucose, ketones, protein, and sediment

- Determination of microalbuminuria in all type 1 diabetic inmates who have had the disease at least five years, and in all inmates with type 2 diabetes, (If routine urinalysis on two or more occasions detects protein, and other causes such as

infection and menses are ruled out, then microalbumin determinations are not necessary because the nephropathy has already progressed to overt proteinuria).

- Urine culture if sediment is abnormal, or symptoms of a urinary tract infection are present

- Thyroid function tests when indicated. Individuals with type 1 diabetes have an increased frequency of autoimmune disorders; a one-time screening TSH for these inmates should be considered.

- Electrocardiogram (baseline)

- Tuberculin skin testing, if not current, in accordance with BOP guidelines

Initial treatment plan: The initial diabetic treatment plan should be reviewed with the inmate by the treating physician, with the assistance of other health care providers, and include the following basic components and recommendations:

- Review of inmate's specific drug treatment regimen and methods for monitoring glucose

- Discussion of necessary lifestyle modifications such as improving food selection, increasing physical exercise, and smoking cessation

- Importance of annual eye exam if indicated

- Need for daily self-examination of the feet

- Need for daily skin examination to include insulin injection sites

- Importance of regular dental examinations and treatment

- Need for regular fasting blood glucose, A1C measurements, lipid levels, and kidney monitoring (urinalysis, BUN and creatinine)

- Need for annual influenza vaccinations and tuberculosis screening

- Education on general drug treatment options and self monitoring for diabetes, the recognition and treatment of severe hypoglycemic and hyperglycemic episodes, and the identification of signs and symptoms of diabetic complications, such as diseases

of the eyes, kidneys, and nervous system.

5. TREATMENT

Principles and goals: Controlled clinical trials indicate that reducing hyperglycemia in diabetic patients to an average A1C of 7% (approximately 1% above normal) will reduce the incidence of long term microvascular complications; whereas an average A1C greater than 8% is associated with a higher risk of diabetic complications. Recommended plasma, whole blood, and A1C glycemic goals are listed in **Appendix 1, Treatment Goals for Nonpregnant Inmates With Diabetes.** Target A1C goals should be individualized based on the inmate's co-morbid conditions and previous response to treatment. The benefits of maximizing glycemic control must be weighed against the potential risks of treatment itself. More intensive lowering of blood glucose may increase the risk of hypoglycemia and weight gain.

Patients with IFG or IGT are at risk of developing diabetes. Once identified, approximately one third of these patients will develop diabetes within five years. The risk of diabetes can be reduced through lifestyle modifications such as improved nutrition and exercise.

Food selection: All inmates with diabetes or IFG or IGT should be counseled by a health care provider on the importance of maintaining a healthy diet. Meal planning for diabetic inmates includes choosing healthy foods from each of the food groups in **Appendix 2, The Food Guide Pyramid (A Guide to Daily Food Choices)** issued by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services, and striving for day-to-day consistency in the timing of meals and the amount of carbohydrates eaten. The appropriate foods at the right times balances with insulin or medication to maintain targeted blood glucose levels. Achieving and maintaining a reasonable body weight is particularly important for inmates with type 2 diabetes, since extra fat makes it harder for these patients to make and use their own insulin. Dietary counseling should include recommendations for choosing a diet low in fat, especially saturated fat, with an emphasis on an adequate intake of grains, fruits, vegetables, and low fat milk. Serving sizes from the Food Pyramid should serve as a guide for appropriate portion sizes. Inmates should be advised to use sugar and salt sparingly.

Physical activity: All inmates with diabetes or IFG or IGT should be counseled regarding the beneficial effects of increased physical activity and appropriate degrees of exercise. Regular exercise improves blood glucose control and contributes to weight

reduction when necessary. Aerobic exercise plans should be individualized based on the inmate's interests, co-morbid conditions, and physical limitations.

Medications - general principles: Type 1 diabetics have little or no pancreatic insulin production, and therefore require insulin administration to transport glucose into cells. Type 2 diabetics initially have normal or elevated insulin production but have insulin resistance at the tissue level. Over time, however, insulin production gradually decreases in type 2 diabetics. Progressive hyperglycemia frequently develops, despite patient adherence to an oral agent and adoption of a healthy diet and regular exercise. Most type 2 diabetics will eventually require intensified therapy with combination drug therapy or insulin as part of their medical therapy.

Oral agents for type 2 diabetes: Oral agents used to treat type 2 diabetes have equivalent efficacy (with the exception of alpha-glucosidase inhibitors and nateglinide), but mechanisms of action and side effect profiles vary significantly. Combining agents from different classes ordinarily results in additive reductions in A1C levels. No single combination regimen has proven more effective in maximizing glycemic control or preventing the long term complications of diabetes, therefore combination regimens should be determined individually based on patient characteristics. Insulin use should not be postponed when oral agents fail to achieve adequate glycemic control.

Major drug treatment options for type 2 diabetes are outlined in **Appendix 3, Oral Agents for the Treatment of Type 2 Diabetes**, in **Appendix 4, Type 2 Diabetes Mellitus - Combination Drug Therapy Options**, and are summarized by class in the following descriptions:

- **Sulfonylureas (SUs)**: Sulfonylureas stimulate insulin secretion and are most effective in treating non-obese, type 2 diabetics. The various sulfonylureas have equivalent efficacy, reducing A1C by 1% to 2%. Second generation sulfonylureas such as **glyburide, glipizide, and glimepiride**, have more favorable side effect profiles and fewer drug interactions than first generation sulfonylureas, such as chlorpropamide, tolazamide, and tolbutamide. Sulfonylureas can be prescribed as monotherapy or combined with other oral agents for diabetes, or with insulin (to achieve glycemic control with a sulfonylurea plus insulin, there must be residual endogenous insulin production). Sulfonylureas should not be used in combination with the non-sulfonylurea secretagogues (repaglinide and nateglinide), due to their similar

mechanism of action. Hypoglycemia (particularly in the elderly and patients with renal insufficiency), and weight gain are the two most common adverse effects of sulfonylurea therapy. All sulfonylureas are metabolized by the liver and excreted in the urine; therefore they should be used with caution in inmates with either renal or hepatic insufficiency.

Sulfonylureas have a relatively high secondary failure rate of 5-10% per year, most likely due to the gradual decline of endogenous insulin production over time. Therefore clinicians should expect eventual loss of glycemic control with sulfonylureas, and educate the inmate that he/she will eventually need to add either another oral agent or insulin to their treatment regimen.

- **Biguanides:** Biguanides, such as **metformin**, reduce hepatic glucose production in the presence of insulin, and reduce hyperglycemia through other poorly defined mechanisms. Metformin reduces A1C levels by 1% to 2%. In contrast to sulfonylureas, metformin is associated with weight loss or no weight gain, and has a lower risk of hypoglycemia. Metformin is ordinarily the drug of choice for obese individuals with type 2 diabetes. Metformin can also be used in combination with insulin, sulfonylureas, non-sulfonylurea secretagogues, and thiazolidinediones.

NOTE: Metformin should be discontinued during acute illnesses where dehydration is a significant risk, or where respiratory acidosis is possible, since metformin usage in these settings may result in life-threatening lactic acidosis. Inmates with acute myocardial infarction, septicemia, on hunger strikes, on a prolonged fast, or with any significant decrease in caloric intake are at risk of this complication. Metformin is not recommended in the elderly, in persons who have renal impairment (creatinine level > 1.5 mg/dL in men or > 1.4 in women), liver dysfunction, congestive heart failure, severe infection or alcohol abuse.

NOTE: Metformin should be withheld 48 hours prior to and following surgery or IV contrast radiograph studies. The inmate should be well hydrated before and after these procedures. Normal renal function should be documented by measurement of serum creatinine 24-48 hours after these procedures before resuming metformin.

NOTE: Metformin can cause vitamin B_{12} deficiency with an associated anemia and neuropathy. The neuropathy may be misdiagnosed as a diabetic neuropathy.

- **Alpha-glucosidase inhibitors (AGIs):** Agents in this category, **acarbose and miglitol**, decrease postprandial hyperglycemia by inhibiting carbohydrate digestion and absorption. AGIs are somewhat less effective in controlling hyperglycemia compared to sulfonylureas and biguanides, reducing A1C levels by 0.5% to 1%. Acarbose and miglitol are best used in a combination regimen to treat diabetes and are particularly useful in patients with predominantly postprandial hyperglycemia; that is, presence of a mild fasting hyperglycemia with disproportionately elevated A1C. These medications must be taken within 15 minutes of beginning a meal in order for them to be effective.

Significant gastrointestinal symptoms including flatulence, diarrhea, and abdominal cramps may occur with AGIs. Symptoms tend to diminish over time and are minimized if therapy is initiated gradually. AGIs are contraindicated in patients with inflammatory bowel disease (Crohn's disease, ulcerative colitis), cirrhosis, or in persons with creatinine > 2.0 mg/dL.

NOTE: Hypoglycemic reactions occurring on acarbose or miglitol therapy must be treated with glucagon, or IV or oral glucose, since oral treatment with sucrose will be blocked by the acarbose or miglitol.

- **Thiazolidinediones (TZDs):** Agents in this drug category, **pioglitazone and rosiglitazone**, reduce insulin resistance in target tissues and enhance insulin action without directly stimulating insulin secretion from the pancreas. TZD therapy results in reduced A1C levels comparable to monotherapy with either sulfonylureas or metformin. TZDs can be prescribed as monotherapy or in combination therapy with insulin (pioglitazone only), sulfonylureas, or metformin. TZDs should ordinarily be restricted to patients who fail or can not take sulfonylurea or metformin, since there are no long term data on adverse effects, or reductions in microvascular and macrovascular complications with TZDs. Slight reductions in blood pressure, increases in HDL cholesterol, and decreases in triglycerides may be added benefits of TZDs. TZDs may cause weight gain, but do not increase the risk of hypoglycemia.

NOTE: TZDs may precipitate heart failure and peripheral edema, and are therefore contraindicated in patients with congestive heart failure.

NOTE: TZDs are also contraindicated in patients with moderate to severe liver disease. Liver function studies should be monitored at baseline, every 2 months for 1 year, and then periodically

thereafter.

- **Non-sulfonylurea secretagogues (non-SUS) [Meglitinides]**: Drugs in this category, including **repaglinide and nateglinide**, stimulate insulin secretion from the pancreas, but have shorter half-lives compared to the similar-acting sulfonylureas. Therapy with repaglinide results in reduced A1C levels comparable to monotherapy with sulfonylureas or metformin; whereas nateglinide is somewhat less effective. Non-SUS agents can cause weight gain and hypoglycemia, but these adverse effects may be less pronounced than that caused by sulfonylureas.

Due to their undetermined long-term safety profile, non-SUS agents should ordinarily not be used as first line agents, but rather as second oral agents in combination with metformin for patients who fail monotherapy or who are not candidates for insulin.

Step therapy for type 2 diabetes: Type 2 diabetics should be treated aggressively, but in a stepwise manner to ensure that glycemic control is maximized, since progressive hyperglycemia frequently evolves with the natural history of the disease. **Note: Although the hemoglobin A1C goal is ≤ 7%, the decision point for making treatment changes is 8%.**

1. Insulin therapy may initially be required to reduce markedly elevated blood glucose levels in patients diagnosed with type 2 diabetes.

2. In stable patients, monotherapy with an oral agent should be initiated with either, **metformin (for obese individuals)** and titrated to the maximum tolerated dose, OR a second generation **sulfonylurea (for non-obese individuals)** in the absence of contraindications to either class of medication. Upon initiating a sulfonylurea, if glycemic control is not achieved with 10 mg of glyburide or 20 mg of glipizide, doubling the dose is unlikely to result in further improvement. If compliance with the sulfonylurea is good and the A1C is ≥ 8%, adding metformin or another appropriate oral agent should be considered.

3. If the A1C is ≥ 8%, with metformin and a sulfonylurea, closely evaluate compliance with diet and physical activity recommendations. Nonadherence to diet and exercise recommendations is the most likely cause of inadequate diabetic control.

4. If glycemic control is still suboptimal with two oral agents,

the next step is to add one injection of intermediate or long-acting insulin at bedtime. The usual starting dose is 8 - 12 units of NPH or Ultralente. The dose should be titrated to achieve a normal FBG without inducing overnight hypoglycemia. The evening insulin dose is typically combined with an HS snack, however this should only be considered on a case-by-case basis where adjustment of the insulin dose not result in the desired response. One of the oral agents (typically the sulfonylurea) may be discontinued at this time.

5. Another acceptable approach if target A1C levels are not achieved on two oral agents is to discontinue both medications, and begin split dose NPH, giving 8 - 12 units before breakfast and before supper.

6. The addition of a third oral agent rather than insulin is rarely indicated or necessary. Individuals who fail to achieve adequate glycemic control on two oral agents most likely have a relative insulin deficiency, confirmed by measuring a serum C-peptide level. C-peptide is a short string of amino acids which are cleaved in the conversion of proinsulin to insulin. Low C-peptide levels in individuals not already using exogenous insulin indicate decreased pancreatic insulin production. In these patients, the addition of a third oral agent such as pioglitazone or rosiglitazone is unlikely to result in additional improvement in A1C levels. In select patients, however, triple therapy with oral medications may be an appropriate treatment strategy.

Insulin therapy indications: Insulin is ordinarily required for the following categories of patients:

- Patients with type 1 diabetes, since they have absolute insulin deficiency and are ketosis prone

- Patients with type 2 diabetes who have significant renal or liver dysfunction and therefore can not take most oral agents

- A subset of patients with type 2 diabetes who are not adequately controlled with one or two oral agents

- Patients initially diagnosed with type 2 diabetes with severe hyperglycemia who require rapid stabilization

Insulin administration: Diabetic inmates requiring insulin should be educated on the appropriate administration of insulin. Self-administration of insulin is recommended whenever feasible. Insulin should be administered subcutaneously at a 45 to 90 degree angle using clean hands at a clean injection site. The

subcutaneous tissues of the upper arms, anterior and lateral thighs, buttocks, and abdomen (no closer than two inches from the umbilicus) dependably allow adequate absorption of insulin. Rotating injection sites is recommended to prevent lipodystrophy.

Insulin syringes should never be shared with another patient or reused in the same patient. **Infection control procedures should be established that disallow recapping of insulin needles and avoid the handling of contaminated syringes by other inmates or health care providers following injections.** Insulin syringes should be promptly disposed in puncture resistant containers following use. Measures should be taken to avoid contamination of insulin solution with the use of multidose vials. Individual (single person use) of multidose vials should be considered when inmates are permitted to draw up their own insulin. Multidose vials should be discarded if their sterility has been compromised.

Insulin pumps are rarely necessary. Newly committed inmates who are on insulin pumps should be assessed to determine if this is the only means by which adequate glucose control can be achieved. A consultation with a physician with expertise in treating diabetes should be obtained before recommending the long term use of an insulin pump.

Step therapy for type 1 diabetes: Type 1 diabetics usually require 0.5 - 1.0 units per kg per day of insulin, divided into multiple daily doses using a ratio of 2/3 long-acting to 1/3 short acting, and giving 2/3 of the daily dose in the morning and 1/3 of the total daily dose in the evening. Thus for a 70 kg male, a typical regimen would consist of 30 U NPH and 15 U Regular before breakfast, and 17 U NPH and 8 U Regular before supper. **Note: Although the hemoglobin A1C goal is ≤ 7%, the decision point for making treatment changes is 8%.** A reasonable approach to managing most type 1 diabetics upon diagnosis includes the following steps:

1. Newly diagnosed type 1 diabetics should ordinarily start with twice daily intermediate acting (NPH) human insulin (average starting dose: 10-20 U) with titration of insulin by 10% every three days based on the fasting and pre-supper blood glucose values. Two thirds of the total daily dose should be given in the morning, and one third in the evening. At the time of diagnosis, total daily insulin requirements are usually in the range of 0.2 - 0.6 U/kg/day, since some endogenous insulin-secreting capability may remain.

2. When further adjustment is required, it is best to adjust the morning insulin dose first to achieve a pre-supper glucose goal of 80-120 mg/dL.

3. Once the pre-supper goal is achieved, the afternoon insulin dose is adjusted until the next day's fasting glucose is also in the 80-120 mg/dL range.

4. Once the inmate's daily insulin requirements reach 35-50 units per day, then the effectiveness of twice daily NPH insulin decreases without supplementation of Regular insulin before meals, two or three times per day.

5. Once both A.M. and P.M. fasting blood glucose levels are within the goal range, the A1C is checked after a minimum of 60 days. If the A1C value is > 8%, then the intermediate insulin is readjusted or short-acting insulin is added to the regimen. This is best monitored by checking blood glucose levels before lunch and at bedtime.

6. If the diabetes treatment goals are still not maintained in spite of a good adherence to exercise and a nutrition program, the clinician might consider either switching to a regimen of a long acting insulin (Ultralente) before the evening meal with three injections of Regular insulin given before each meal based upon fasting blood glucose, or adding metformin to improve insulin sensitivity. There have been no controlled trials directly comparing Lente or Ultralente insulin with glargine insulin (Lantus); thus there are no proven advantages to the use of Lantus if a long acting insulin is being considered.

Note: One disadvantage to the use of Lantus is that it cannot be mixed with any other insulins.

Note: Fixed dose insulin combinations (e.g. 70/30 insulin preparations), are generally not suitable for insulin-requiring diabetics who wish to achieve target A1C levels. These insulin formulations do not allow sufficient flexibility to match changes in caloric intake with appropriate doses of short- and long-acting insulin.

Note: Type 1 diabetics, and any type 2 diabetics who require short-acting insulin as part of their treatment regimen, must have access to glucose monitoring on an as-needed basis (typically before each dose of short-acting insulin), in order to achieve optimal control and avoid hypoglycemia.

Note: Ultra-short acting insulin (lispro and aspart) should be

avoided in most circumstances because the margin for error is too narrow. Anything which keeps the inmate from eating within 20-30 minutes after lispro injection is very likely to induce symptomatic hypoglycemia. (If the lispro dose is not high enough to cause at least some symptoms of hypoglycemia if not matched with food, then adequate glucose control will not be achieved).

Coordination of insulin and food intake: The correctional environment poses several challenges for coordinating insulin administration and food intake for diabetic inmates who require multiple doses of insulin per day, particularly when short-acting insulin is prescribed. The objective of using short-acting insulin is to match the peak of postprandial blood glucose with the peak of insulin action, attempting to mimic normal physiology. The consequences of insulin/food mismatch are, at best, suboptimal control of hyperglycemia; at worst, the result is frequent and potentially severe hypoglycemic episodes. The shorter the onset and peak of the insulin, the more critical the coordination between food intake and insulin administration. Short-acting insulin is typically administered two to three times per day, and ideally should be administered prior to a meal, to allow some absorption of insulin prior to the rise in blood glucose which occurs during a meal. In certain situations, a short-acting (Regular) insulin can be administered immediately after eating, rather than before eating if the timing of meals is uncertain. Although the inmate will have a short period of postprandial hyperglycemia, this causes fewer long-term consequences and good diabetic control can still be achieved.

Factors to consider in optimizing insulin/food coordination in a correctional environment include:

- Do all insulin-requiring diabetics eat at approximately the same time at each meal? Depending on the size of the dining hall, the size of the inmate population, and the type of meal being served, it may take between one and three hours to serve one meal. Is the pill line open during this entire period to administer insulin? Do inmates have free movement to go to the pill line before they go to the dining hall?

- If insulin is given prior to a meal, and then an institution recall occurs (a lockdown, an emergency count, a fog line, a severe weather incident, etc.) which prevents these inmates from eating, are there contingency plans to provide food to prevent hypoglycemia? How quickly could a sack lunch or a snack be provided to inmates who had received their insulin but were then prevented from eating their usual meal?

Because of the many factors which can interfere with optimal timing of insulin and food in a correctional environment, the insulin regimen should be as "forgiving" as possible. This often means using a long-acting insulin which is titrated to keep preprandial and fasting blood glucose as low as possible without hypoglycemic episodes.

Maximizing glycemic control: Glycemic control is the fundamental goal for managing patients with diabetes. Frequent monitoring of blood glucose (three times per day) is optimal for most patients with type 1 diabetes, inmates with type 2 diabetes who are using a split dose insulin regimen, and for pregnant women taking insulin. The optimal frequency of glucose monitoring for patients with type 2 diabetes is uncertain and should therefore be determined on a case by case basis. Type 2 diabetics who are well controlled on oral agents and not on insulin generally have no need for a personal glucose monitor.

In the correctional setting, glucose monitoring methods and frequency must be determined both by relevant patient factors and the security concerns of the institution. One or more of the following strategies can be implemented that permit adequate monitoring of blood or plasma glucose in inmates with diabetes:

- Issue, or make available for purchase, blood glucose meters to those inmates who are using insulin, or who otherwise must monitor their glucose frequently in order to reach therapeutic goals or avoid repeated hypoglycemia. So-called "one touch" monitors are preferable due to the ease of use and lower potential for operator error. Many of these devices have cable ports that allow stored data to be downloaded to a software program and printed for the medical record. Inmates must concurrently be taught how to use a sliding scale for insulin, and be given parameters for when to request advice from a health care provider. This method should be considered on a case by case basis. Self-monitoring may require lancets which need to be disposed of in biohazard containers. Small cylindrical red biohazard containers are available for issue to inmates. These containers should be labeled with the inmate's name and register number, so that they may be returned to the pharmacy for exchange when 3/4 full.

- Provide a glucose meter to inmates at each pill line, prior to requesting their insulin dose. This may not be feasible when there are more inmates than can be tested during a given pill line, or when adequate supervision of the area where inmates are testing is impossible.

- Systematically implement frequent call-outs for diabetic inmates for testing by a nurse or other health care provider. This method is very labor-intensive but may be the only reasonable option for certain inmates or at certain institutions.

- House diabetic inmates in the same housing unit, where testing or self-monitoring can be consolidated allowing greater control from a security perspective.

- Institute unique procedures/programs that address both the need for frequent glucose monitoring and the specific security concerns of the institution and inmate population.

6. GESTATIONAL DIABETES

Potential complications: Gestational diabetes (GDM) affects approximately 7% of all pregnant women. The fetuses of mothers with hyperglycemia are at greater risk for intrauterine death or neonatal mortality, therefore women with GDM must be monitored closely. GDM is associated with fetal macrosomia as well as neonatal hypoglycemia, hypocalcemia, polycythemia and hyperbilirubinemia.

Monitoring and treatment during pregnancy: The following guidelines should be considered when managing inmates with GDM:

- Close surveillance of the mother and fetus must be maintained throughout the pregnancy. Self monitoring of blood glucose should be done on a frequent (daily) basis. Monitoring of urinary glucose is not adequate.

- Screening for hypertension should include measurement of blood pressure and urine protein.

- Clinical estimation of fetal size and asymmetric growth by serial ultrasounds, especially early in the third trimester, may identify large infants that would benefit from maternal insulin therapy.

- All inmates with GDM should receive dietary counseling and the provision of adequate calories and nutrients during pregnancy.

- Insulin therapy should be considered if dietary management does not keep the fasting whole blood glucose $\leq$ 95 mg/dL or the fasting plasma glucose $\leq$ 105 mg/dL, or the two hour postprandial whole blood glucose $\leq$ 120 mg/dL or the two hour postprandial plasma glucose $\leq$ 130 mg/dL.

- Oral hypoglycemic agents should only be considered in lieu of insulin on a case by case basis after careful consultation with an obstetrician since their efficacy and safety are currently being investigated.

- Breast feeding should be encouraged in women with gestational diabetes mellitus.

Postpartum monitoring: Women with GDM are at an increased risk for developing diabetes later in life and should be educated on the importance of maintaining normal body weight, good nutrition, and physical activity. If glucose levels are normal postpartum, a screening FBG should be obtained every three years in asymptomatic inmates. Inmates should be taught to recognize symptoms of hyperglycemia so that they readily seek medical attention with the onset of diabetes. Inmates with IFG or IGT should be screened for diabetes with a FBG annually and counseled regarding diet and a plan for aerobic exercise or increased physical activity.

7. MEDICAL MANAGEMENT OF DIABETIC COMPLICATIONS

Hypertension: Patients with diabetes and hypertension should have their blood pressure lowered to targeted levels since serious microvascular and macrovascular diabetic complications are strongly linked to hypertension. The optimal goal of treatment for non-pregnant diabetics > 18 years of age is a blood pressure < 130/80 mmHg. ACE inhibitor drug therapy is indicated for hypertensive diabetic inmates with underlying nephropathy and should also be considered for diabetic inmates, with or without hypertension, who have other cardiovascular risk factors. Combination drug therapy is often required to adequately control blood pressure in diabetic patients.

Aspirin therapy: Aspirin therapy is an effective intervention for preventing serious cardiovascular events such as myocardial infarctions and stroke. Enteric-coated aspirin in dosages of 75-325 mg/day should be considered a standard part of treatment for most patients with diabetes, since diabetes itself is a coronary heart disease risk equivalent. Aspirin is indicated for the following inmates unless medically contraindicated:

- All inmates with diabetes and evidence of atherosclerosis (e.g., coronary artery disease, peripheral vascular disease)

- As primary prevention strategy for inmates ≥ 40 years of age with one or more cardiovascular risk factors (n.b., do not routinely use aspirin in inmates < 21 years of age due to the

increased risk of Reye's syndrome)

Dyslipidemia: Type 1 and type 2 diabetes are considered coronary heart disease (CHD) risk equivalents due to the strong association of diabetes and serious cardiovascular disease. Type 2 diabetes is associated with other CHD risk factors such as elevated LDL cholesterol, low HDL cholesterol, and elevated triglycerides. Lipid disorders should be aggressively managed in diabetic patients to reduce the risk of serious cardiovascular events. The therapeutic LDL goal for diabetic patients is < 100 mg/dL. Monitoring and treatment strategies for lipid disorders should be pursued in accordance with established guidelines from the National Cholesterol Education Program.

Diabetic nephropathy: Microalbuminuria (30 to 300 mg/24 hour) is the earliest stage of kidney disease associated with diabetes; often progressing to clinical albuminuria (greater than 300 mg/24 hours) with a subsequent decline in renal function over a period of years. Hypertension usually develops during the onset of microalbuminuria and if left untreated can hasten the progression of renal disease. Prevention and treatment recommendations for diabetic nephropathy include the following:

- Maximize glycemic control which will delay the onset of microalbuminuria

- Screen for microalbuminuria

- Treat inmates with or without hypertension with microalbuminuria with ACE inhibitors (unless medically contraindicated); monitor for hyperkalemia

- Lower blood pressure to < 130/80, using multi-drug therapy if necessary

- Restrict protein intake with the onset of nephropathy

- Avoid metformin in persons with a creatinine above 1.5 due to the risk of acidosis

- Measure creatinine clearance once renal disease is suspected (Consultation with a physician experienced in the care of diabetic renal disease should be considered when the GFR has fallen to < 70 ml/minute or when the serum creatinine is > 2.0 mg/dL.)

Diabetic retinopathy: Patients with type 1 diabetes do not usually have vision-threatening retinopathy in the first five

years of their disease. Over the next 20 years, however, nearly all type 1 diabetics develop some retinopathy. A significant percentage of patients with type 2 diabetes have retinopathy at the time of diagnosis and many will develop some degree of retinopathy over subsequent years. Retinopathy progresses in a predictable manner, advancing from mild background abnormalities to pre-proliferative retinopathy to proliferative retinopathy. Vision loss occurs through the loss of central vision by macular edema or capillary non-perfusion or by proliferative retinopathy that can lead to retinal detachment and irreversible vision loss. The proliferative vessels may also bleed, leading to pre-retinal or vitreous hemorrhage. Prevention and treatment recommendations for diabetic retinopathy include the following:

- Maximize glycemic control, since this reduces the risk of progression to clinically significant retinopathy

- Maximize blood pressure control

- Screen diabetic patients for retinopathy since proliferative retinopathy and macular edema may occur in completely asymptomatic patients

- Monitor pregnant patients with diabetes closely, since pregnancy may aggravate retinopathy

- Continue aspirin therapy (NOTE: it neither prevents retinopathy nor increases the risk of retinal hemorrhage)

- Refer for laser photocoagulation surgery when indicated (NOTE: photocoagulation reduces the risk of further visual loss in patients with retinopathy, but does not ordinarily reverse established visual loss).

Diabetic neuropathy: Peripheral diabetic neuropathy may result in pain, loss of sensation and muscle weakness. Autonomic neuropathy may involve the gastrointestinal, cardiovascular, and genitourinary systems resulting in related symptoms and complications. Neuropathy is treated by maximizing glycemic control and addressing related symptoms.

Foot ulcers and amputations are a specific complication of diabetes that are frequently related to neuropathy. The risk of amputation is related to the following risk conditions: peripheral neuropathy with a loss of sensation, evidence of increased pressure (erythema, hemorrhage under a callus), peripheral vascular disease (absent distal pulses), severe nail disease, and a history of foot ulcers.

Screening for diabetic neuropathy should include monofilament testing as outlined in **Appendix 5, The Carville Diabetic Foot Screen** that should be documented on **Appendix 6, Progress Note: Diabetic Foot Examination.**

Footwear recommendations for inmates with diabetes should consider the following:

- The current version of the BOP standard issue work shoe addresses most concerns of diabetic and non-diabetic inmates.

- The institution is required to provide an inmate with a proper fitting work shoe. Tennis shoes and other recreational footwear are solely the responsibility of the inmate.

- Although in rare cases a tennis shoe may be the most appropriate choice for a diabetic inmate, inmates with severe neuropathy are best served with protective footwear such as a steel-toe work shoe or boot, which minimizes the chance that incidental foot trauma will result in a diabetic ulcer. Extra wide, extra deep toe boxes will minimize the risk of irritation to feet with deformities and/or impaired sensation.

- Medically-ordered footwear should be considered in certain circumstances, including the following:

    - Symptomatic foot deformities such as large bunions, pronounced hammertoes, and similar conditions where regular-issue shoes of the appropriate size and width are causing significant skin irritation or ulceration.

    - Inmates with Risk Category 2 or 3 as determined by the Carville Foot Screen. These are inmates with loss of protective sensation and a deformity (bunion, hammertoe, etc.) with or without a history of a plantar ulcer, plus any evidence of skin redness, swelling, increased skin temperature to touch, cracking, or maceration.

    - Significant vascular disease is suggested by claudication, absent dorsalis pedis or tibialis posterior pulses or other studies.

Dental care: The primary concern for diabetic inmates requiring dental treatment is the avoidance of metabolic imbalances during treatment interventions.

- Dental procedures: Dental practitioners should confirm that diabetic inmates have eaten breakfast and received morning

medications prior to providing dental care. Special attention should be given to patients with severe periodontal disease, since this may be an indicator of poor glycemic control. If possible, the inmate's blood glucose should be assessed the day of the dental appointment through glucometer testing or other available method. Adequately controlled diabetic inmates can be treated in a manner similar to patients without diabetes.

Dental care should be provided to diabetic inmates early in the day. Blood glucose and endogenous corticosteroid levels are usually higher at this time, resulting in improved patient outcomes. Patient encounters should be brief. If the dental procedure extends into a scheduled meal, clinicians should provide a break for an appropriate snack. If this is not feasible, patient care should be concluded and continued at another appointment.

Inmates with diabetes should be instructed to tell dental staff when they feel symptoms of an insulin reaction occurring. Dental practitioners should always be prepared for a hypoglycemic episode. A source of sucrose (or glucose/glucagon if the inmate is taking acarbose) should be kept in the clinic for such emergencies.

Patients undergoing extensive periodontal or oral surgical procedures should have special attention paid to their dietary needs after surgery. The inmate's primary physician should be consulted for dietary recommendations during the postoperative period.

- **Oral complications of diabetes**: Oral pathology in patients with uncontrolled diabetes mellitus is caused by excessive loss of fluids, an altered response to infections, microvascular changes, and possibly the increase in salivary glucose concentrations. The effects of hyperglycemia and related polyuria deplete extracellular fluids and reduce salivary secretion causing a dry mouth (xerostomia). Oral complications most commonly associated with diabetes are xerostomia, burning and/or enlargement of the tongue, denture sore mouth, candidiasis, cheilosis, and periodontal disease.

The increased prevalence of dental caries in young diabetic patients is related, at least in part, to reduced salivary flow. Diabetes is associated with an increase in the incidence and the severity of gingival inflammation, periodontal abscesses, and chronic periodontal disease. Healing may be delayed in individuals with uncontrolled diabetes, increasing the susceptibility to oral infections following surgical procedures.

Inmates with uncontrolled hyperglycemia of unknown cause should be screened carefully for an occult dental infection, particularly following dental procedures.

Medical decompensation (hospitalization criteria): The decision to admit inmates to an inpatient hospital unit should be made on a case by case basis, but the following indications generally warrant hospitalization for outpatients with diabetes:

- Diabetic ketoacidosis that is characterized by a plasma glucose > 300 mg/dL with an arterial pH < 7.30, an increased anion gap, and serum bicarbonate level < 15 mEq/L, along with moderate ketones in the urine or blood. Low sodium, elevated potassium, and elevated BUN may also occur. Total body intracellular potassium may be significantly depleted regardless of serum potassium levels.

- Hyperglycemic hyperosmolar state that is characterized by an elevated serum osmolality (> 320 mOsm/kg) usually with severe hyperglycemia (plasma glucose > 600 mg/dL) associated with an altered mental status that may progress to coma.

- Hypoglycemia that is severe with a blood glucose < 50 mg/dL and an altered mental status that does not readily improve with treatment or is associated with neurologic deficits. (**Note:** hypoglycemia caused by sulfonylureas can be prolonged or recurrent due to the drugs' long duration of action. Symptomatic hypoglycemia which cannot be managed with frequent feedings over a 24 hour period should be treated in a hospital setting.)

- Uncontrolled hyperglycemia diagnosed during pregnancy.

- Moderate to severe hyperglycemia that is unresponsive to standard therapies or associated with an acute illness

- Severe complications of diabetes that warrant inpatient evaluation and treatment

8. PERIODIC EVALUATIONS

Overview: Diabetes management requires not only dedicated clinicians, but also the expertise of other treatment professionals, that may include pharmacists, nurses, optometrists or ophthalmologists, dieticians, physical therapists, and recreation specialists. Inmate treatment plans should be individualized, include measurable goals, and emphasize self-management. Regularly scheduled evaluations help maximize glycemic control, reduce diabetic complications and enhance

educational efforts. A one page summary of recommended periodic evaluations is attached in **Appendix 7, Recommendations for Diabetic Chronic Care Clinic Monitoring.**

The frequency of chronic care clinics for diabetic inmates should be individualized, depending on the degree of glycemic control, the complexity of the medication regimen, the frequency of changes to the treatment regimen, the presence of complications of diabetes and co-morbid conditions, and the inmate's understanding of his or her disease and self motivation. Inmates with uncomplicated diabetes controlled by diet and exercise alone can be monitored predominantly by midlevel providers. Inmates with chronically poorly controlled diabetes or other serious complications such as heart or kidney disease should be monitored closely by a physician along with the patient's midlevel provider(s). Weekly or monthly clinician evaluations may be necessary for brittle diabetics.

Inmates with IFG or IGT should be monitored for the development of diabetes with periodic measurements of FBGs. One-third of these patients will be diagnosed with diabetes within five years.

Medical history: The periodic patient interview should target the following concerns:

- The results of glucose monitoring and review of medication and/or insulin compliance

- Frequency, causes, and severity of any hypoglycemic symptoms experienced since last visit

- Changes in treatment regimen or lifestyle changes made by the inmate between clinic visits (attempt to assess the inmate's participation in exercise, diet, and smoking cessation programs)

- Evaluation for symptoms of concurrent illnesses such as untreated infections (e.g., tinea pedis, tinea cruris, ear infections, and urinary tract infections)

- Screening for symptoms that suggest evolving complications, such as paresthesias, weakness, angina, visual disturbances, skin infections, foot problems

Physical examination: The periodic examination should target the following (a more comprehensive physical should be conducted annually and whenever clinically necessary):

- Vital signs and weight

- Foot exam (inspection, palpation of pulses, and an annual sensory exam, preferably using a LEAP filament)

- Focused exam on organ systems targeted by positive responses to interim history or presence of diabetic complications

Glucose monitoring:

- Fasting or random glucose (fingerstick or by venipuncture) should be assessed frequently during clinician, nursing, and pharmacist evaluations of inmates with diabetes with notation as to the number of hours the sample is obtained postprandially. (If recent laboratory data are not available, at a minimum, a random fingerstick glucose should be measured as an indication of the degree of glucose control.)

- Inmates initiating insulin therapy or making a major change in their insulin program may need to be seen by a health care provider as frequently as **daily** until glucose control is achieved, the risk of hypoglycemia is low, and the inmate is competent and comfortable implementing the treatment plan.

- Inmates beginning treatment by diet or oral glucose-lowering agents may need to be seen as often as **weekly** until reasonable glucose control is achieved and the inmate is competent to conduct the treatment program.

- The frequency of health care provider monitoring of blood glucose values should be determined on a case by case basis while considering the following factors that affect glycemic control:

  - Whether or not the inmate is self-monitoring

  - Variations and degree of glycemic control as documented by A1C levels

  - Treatment with insulin versus oral agents

  - Frequency of symptoms of hypoglycemia

  - Frequency of prior adjustments in therapy

  - Inmate motivation for self-care and the presence of limitations such as language barriers and mental illness

  - Presence of diabetic complications (e.g. diabetics with retinopathy should be more closely monitored to protect them from wide fluctuations in blood glucose, which is thought to

accelerate proliferative retinopathy)

- A FBG should be obtained prior to routine quarterly chronic care evaluations.

- Periodic measurement of A1C levels is essential to assess glucose control and compliance with therapy. Quarterly measurements are recommended if treatment changes are made or glucose goals are not met; otherwise, measurements two times per year are ordinarily adequate. **NOTE:** A1C measurements should be obtained just **prior** to a scheduled appointment to review glycemic control. Medication adjustments should never be made based on A1C levels which were obtained more than 30 days prior to the appointment.

- Urine glucose monitoring has limited value, and should only be considered as an alternative assessment of glucose control if inmates are unable or unwilling to perform blood glucose testing.

Monitoring for diabetic complications: Inmates should receive the following evaluations to screen for diabetic complications:

- Annual serum electrolytes and creatinine to assess renal function

- An annual screening test for microalbuminuria for inmates with type 1 diabetes for more than 5 years and for all inmates with type 2 diabetes (unless proteinuria has already developed)

- An annual fasting lipid profile to screen for hypercholesterolemia

- An annual comprehensive dilated eye and visual examination by an ophthalmologist or optometrist for all type 1 diabetics who have had the disease for five or more years, and for all inmates with type 2 diabetes (Any diabetic inmates with visual symptoms or other serious ophthalmologic problems should also have annual eye examinations. Diabetics screened by an optometrist should be referred to an ophthalmologist if ocular complications of diabetes or other serious problems are identified.)

- An annual foot examination to identify risk factors for amputation and to assess sensory loss through monofilament testing

Inmate education: All inmates with diabetes should receive education from a health care provider at the time of diagnosis and periodically during health care provider evaluations and

treatments. Inmates should be counseled on the symptoms of hyperglycemia and hypoglycemia, the natural history of diabetes complications, the importance of glycemic control, the benefits of healthy dietary selections and regular exercise, the importance of modifying heart disease risk factors, and medication benefits and side effects. Inmates with poor glycemic control require more intensive personal or group educational efforts. Educational materials are attached in **Appendix 2, The Food Guide Pyramid (A Guide to Daily Food Choices), Appendix 8, Keys to Diabetes Control, and Appendix 9, Inmate Fact Sheet (Diabetes).**

Documentation: Periodic clinician evaluations should be documented in the inmate's medical record. The chronic care flow sheet for diabetes (BP-S670.060) is recommended for inmates who will be monitored for more than one year.

9. HEALTH CARE PROVIDER RESOURCES AND SELF ASSESSMENT

Provider resources for managing diabetes are listed in **Appendix 10, Resources (Diabetes)**, and **Appendix 11, Provider Self Assessment, (Management of Diabetes).**

ATTACHMENTS

Appendix 1: Treatment Goals for Nonpregnant Inmates
Appendix 2: The Food Guide Pyramid
Appendix 3: Oral Agents for the Treatment of Type 2 Diabetes
Appendix 4: Type 2 Diabetes - Combination Drug Therapy Options
Appendix 5: The Carville Diabetic Foot Screen
Appendix 6: Progress Note: Diabetic Foot Examination
Appendix 7: Recommendations for Chronic Care Clinic Monitoring
Appendix 8: Keys to Diabetes Control
Appendix 9: Inmate Fact Sheet (Diabetes)
Appendix 10: Resources (Diabetes)
Appendix 11: Provider Self Assessment (Management of Diabetes)

TREATMENT GOALS FOR NONPREGNANT INMATES WITH DIABETES*

	Normal	Goal	Intervention
Plasma values			
Average preprandial glucose (mg/dl)	<110	90-130	<90/>150
Average bedtime glucose (mg/dl)	<120	110-150	<110/>180
Whole blood values			
Average preprandial glucose (mg/dl)	<100	80-120	<80/>140
Average bedtime glucose (mg/dl)	<110	110-140	<100/>160
A1C(%)	<6	<7	>8

*Adapted from American Diabetes Association guidelines, 2002

(Replace this and the next page with Appendix 2, The Food Guide Pyramid)
(Two pages)

Oral Agents for the Treatment of Type 2 Diabetes

Agent	Initial Dose & Treatment	Maximum Dose	Initial Elderly Dose	Side Effects	Drug Interaction
Second Generation Sulfonylureas Glyburide (DiaBeta, Micronase)	2.5 - 5 mg/day; increase dose by 2.5- 5 mg no more often than every 7 days	20 mg	1.25-2.5 mg	hypoglycemia and weight gain	alcohol; coumarin; zole antifungals; asparaginase; corticosteroids; thiazide diuretics; lithium; beta blockers; cimetidine; ranitidine; cyclosporine; quinolones; MAO inhibitors; chloramphenicol; octreotide; pentamidine
Glyburide, microcrystalline (Glynase)	1.5 -3 mg/day; increase by $\leq$ 1.5 mg weekly if needed	12 mg	1.25 mg	hypoglycemia and weight gain	same as above
Glipizide, short-acting (Glucotrol)	5 mg/day, 30 min before breakfast; increase dose by 2.5 - 5 mg a week as needed	40 mg give bid when dose reaches 15 mg	2.5 - 5 mg	hypoglycemia and weight gain	same as above
Glipizide, extended release (Glucotrol XL)	5 mg/day at breakfast; increase dose by 2.5 - 5 mg at 3 month intervals based on HbA1C	20 mg	2.5 mg	hypoglycemia and weight gain	same as above
Glimepiride (Amaryl)	1-2 mg daily with breakfast or first main meal; increase at 1-2 mg increments every 1-2 weeks as needed	8 mg once daily	0.5 - 1 mg	hypoglycemia and weight gain	same as above
Biguanides Metformin (Glucophage) ****Contraindications to metformin therapy :** elevated creatinine (>1.4mg/dL in women or >1.5mg/dL in men), or a creatinine clearance < 60mL/min in the elderly; history of renal insufficiency, hepatic dysfunction, or serious cardiovascular or pulmonary compromise	500 mg with a meal; on the basis of patient's tolerance to metformin and glycemic response, increase dosage by 500 mg/day at weekly intervals, adding a dose to another meal; tid dosing not required for efficacy but may decrease GI complaint; doses >1000 mg/day with meals will likely be needed for therapeutic effect as monotherapy; doses >2000 mg/day have little added benefit.	2550 mg/day (850 mg tid); OR 2500 mg/day (500 mg tab)	500 mg	nausea and diarrhea that usually subside over 1 week may limit rate of dose increase; hypoglycemia only if metformin is given with sulfonylurea or insulin	alcohol - cimetidine - amiloride - digoxin - morphine - procainamide - quinidine - ranitidine - triamterene -trimethoprim - vancomycin - furosemide - calcium channel blocking agents especially nifedipine ***withhold 48 hours prior to and following surgery or IV contrast x-ray studies.**
Alpha-Glucosidase Inhibitors Acarbose (Precose)	25 mg tid with first bite of meals; lower dose may be needed if gastrointestinal distress is noted. Increase dose to 50 mg tid with meals after 4-8 weeks	100 mg tid with meals or 50 mg tid with meals (In patients $\leq$ 60 kg)	25 mg	diarrhea (33%) abdominal pain (12%) flatulence (77%) * serum transaminase elevations may occur at doses >50mg tid.	absorbents, intestinal agents such as activated charcoal digestive, enzyme preparations containing carbohydrate - splitting enzymes such as amylase or pancreatin
Thiazolidinediones Rosiglitazone (Avandia)	4 mg qd or 2 mg bid; increase to 8 mg qd or 4 mg bid in 12 weeks as needed	8 mg/day	2 mg	edema; fluid retention may cause or exacerbate CHF.	erythromycin- calcium channel blocker- corticosteroids -cyclosporine - hmg coa reductase inhibitors - triazolam - trimetrexate - ketoconazole - itraconazole
Pioglitazone (Actos)	15 or 30 mg qd; increase to 45 mg qd monotherapy or 30 mg qd as combo therapy	45 mg/day monotherapy; 30 mg/day combo therapy	15 mg	edema * decreases oral contraceptive efficacy	same as above
Meglitinides Repaglinide (Prandin)	0.5 mg with each meal if HbA1C <8%, 1 - 2 mg with each meal if HbA1C $\geq$8%; Increase by 1 mg weekly as needed	4 mg with meals (max 16 mg total per day)	0.5 mg	hypoglycemia and weight gain	***contraindicated in moderate-severe hepatic dysfunction** beta- adrenergic blocking agents; drugs metabolized by the cytochrome p450 system; erythromycin; ketoconazole; miconazole; sulfonamides; MAO inhibitors; NSAIDS; anticoagulants (warfarin derivatives)
Nateglinide (Starlix)	60 mg, 1 to 30 min before each meal if HbA1C < 8%; 120 mg if > 8%	180 mg tid	60 mg	hypoglycemia and weight gain	same as above

Type 2 Diabetes Mellitus - Combination Drug Therapy Options
Sulfonylurea + Biguanide
Sulfonylurea + Insulin
Biguanide + Insulin
Sulfonylurea + Alpha-glucosidase inhibitor
Sulfonylurea + Biguanide + Insulin*
Biguanides + Alpha-glucosidase inhibitor*
Thiazolidinedione + Insulin
Biguanide + Meglitinide
Rosiglitazone or Pioglitazone + Sulfonylurea
Alpha-glucosidase inhibitor + Insulin*
Sulfonylurea + Biguanide + Thiazolidinedione*

* Denotes less frequently used therapy/less studied therapy

THE CARVILLE DIABETIC FOOT SCREEN

This appendix was adapted directly from the LEAP program at the Hansen's Disease Center, Carville, Louisiana. A BOP-designed progress note for documenting these examinations is found in **Appendix 6,** a Word Perfect version of the Form 600 with the outline of the examination overprinted. This form may be printed and inserted in chronological order in section 1 of the Inmate Medical Record.

Section I

In the first section of the Foot Screen, the five questions can be answered in the Yes or No blank with an R, L, or B to indicate a positive or negative finding in the right, left, or both feet.

1. Has there been a change in the foot since the last evaluation?

On a first visit, enter N/A unless the inmate has noticed a change in strength or sensation within the past year. If that is the case, then check Yes. The purpose of this question is to determine from the inmate if he/she has perceived a change in the strength or sensation of their feet. Any change is significant in a foot screen.

For example, an improvement in the inmate's perception of sensation could be a sign that the inmate is having a reversal of some of the neuropathic changes. Alternatively, if the inmate perceives a change for the worse, this could be a sign of worsening of the neuropathy.

2. Is there a foot ulcer now, or history of foot ulcer?

The purpose of this question is to determine if the inmate has now, or has ever had an ulcer on the foot. A positive history of a foot ulcer places the inmate permanently in Risk Category 3. Once an inmate has ulcerated, he or she is always at an increased risk of developing another foot ulcer. The inmate is also at risk of developing a progressive deformity of the foot and ultimately amputation of the lower extremity.

3. Does the foot have an abnormal shape?

This is determined by inspecting the general shape of the inmate's foot. Conditions to consider include: foot drop, eversion or inversion deformity, partial or complete amputations of the foot or toes, clawed toes, bunions, and especially a "Charcot Foot."

A Charcot Foot is a foot which is moderately to severely deformed as a result of insensitivity and repeated injury. Fractures in an insensitive foot frequently fail to heal properly and can progress to the so-called boat shaped foot. These feet are at extreme risk of amputation and require immediate, expert care. A patient with a Charcot Foot is always in Category 3.

4. Is there weakness in the ankle or foot?

Unless the inmate has an open ulcer or infection of the foot, a rough estimate of strength can be made by asking the inmate to walk alternately on their heels and then on their toes.

5. Are the nails thick, too long, or ingrown?

If severe nail problems are present or if there is uncertainty about the vascular status of the toes, refer the inmate to an appropriate evaluator.

Section II

In the next section of the foot screen, the examiner does a sensory exam of the foot using the 10 gram monofilament and records the findings on the form in the circles on the foot drawing.

There are ten places on each foot that are routinely tested. If the inmate can feel the filament, put a "+" in the appropriate circle. If they cannot feel it, put a "-".

The sensory exam should be done in a quiet and relaxed setting, where the inmate can lie down. The inmate should not watch while the examiner applies the filament.

Section III

Next, examine the foot and record the problems identified by drawing or labeling as appropriate on the Foot Screen form.

If there are callouses, pre-ulcerative lesions (a closed lesion, such as a blister or hematoma) or open ulcers, draw or describe them as accurately as possible.

Then, draw in and label areas that are significantly red, warm (warmer than the other parts of the foot or the opposite foot), dry or macerated (friable, moist, soft tissue).

Section IV

This is the vascular assessment. Vascular studies are an important part of a foot evaluation in patients with diabetes and should at least include the palpation of pulses. More extensive evaluations such as doppler studies and angiography should be considered on a case by case basis.

Section V

Footwear is discussed under the appropriate Risk Category below.

Section VI

Risk Categorization: The accurate categorization of inmates into their respective Risk Category is a key element in the Foot Screen. The higher the Risk Category, the higher the risk an inmate has of recurrent foot ulceration, progressive deformity and ultimately, amputation of the foot.

____**Category 0**: No loss of protective sensation.

This is a patient who has essentially no risk of developing foot complications as a result of their disease. This patient does not need special footwear.

Category 1: Loss of protective sensation, no deformity or history of plantar ulceration.

This patient has lost sensation to the point that they are defined as not having "protective sensation." These patients cannot feel the 10 gram monofilament and therefore cannot trust their sensation to prevent injury. The patients in this and the following two categories should **never** walk barefoot. They do not have enough sensation to prevent injuring themselves (e.g. as a result of stepping on sharp objects).

Patients in this and the following two categories need to pay special attention to the fit and style of their shoes and should avoid pointed toed shoes or high heels. Category 1 patients do not need "custom" shoes. They usually do well in a jogging shoe or a well-fitting street shoe.

Category 2: Loss of protective sensation and deformity, no history of plantar ulceration.

This patient, in addition to the loss of protective sensation, also has additional abnormalities, but has not progressed to the point of ulceration (current or past). They may need extra depth shoes with custom molded insoles to accommodate deformity of their feet. These patients can frequently wear a jogging shoe with a soft insert.

Category 3: History of plantar ulcer.

This patient has loss of protective sensation and has progressed to the point of plantar ulceration (current or past). They will need extra depth shoes with soft molded inserts to accommodate any deformity of their feet. They may need custom-made shoes to manage their foot problems once their ulcer is healed.

FILAMENT APPLICATION INSTRUCTIONS

The sensory testing device used with the Foot Screen is a nylon filament mounted on a holder that has been standardized to deliver a 10 gram force when properly applied. Hansen's disease researchers have shown that a patient who can feel the 10 gram filament in selected sites are not at increased risk to develop ulcers.

1. Sites to be tested:

   Dorsal foot: center of the top of the foot

   Plantar foot:
   (1) center of the heel pad
   (2) medial arch
   (3) "ball" of foot
   (4) over distal 3rd metatarsal head
   (5) over distal 5th metatarsal head
   (6) over proximal 5th metatarsal

2. Apply the filament perpendicular to the skin's surface.

3. The approach, skin contact and departure of the filament should be approximately 1 ½ seconds duration.

4. Apply sufficient force to cause the filament to bend.

5. Do not allow the filament to slide across the skin or make repetitive contact at the test site.

6. Randomize the selection of test sites and time between successive tests to reduce the potential for patient guessing.

7. Ask the patient to respond "yes" when the filament is felt and record the responses.

8. Apply the filament along the perimeter of and NOT on an ulcer site, callus, scar or necrotic tissue.

(Insert copy of 600 form with Diabetic Foot Examination, reprinted-front and back)

Recommendations for Diabetic Chronic Care Clinic Monitoring

Patient Evaluation / Routine Exam - SOAP Format

S: < Observations and patient complaints >

O: Vital signs : blood pressure, pulse, respiration rate, temperature, weight, height
HEENT: (include fundoscopic exam and neck evaluation)
Lungs/Heart:
Abdomen:
Extremities/ Peripheral pulses / Neuropathy / Visual Foot Examination
Labs, X-Rays, Other Studies

A: Assessment, Analysis of data , Diagnosis

P: Therapeutic regimen
Diagnostic studies
Education - adherence to all self care aspects, exercise evaluation,
follow-up of referrals, smoking cessation

Procedure, Test, Examination	Baseline Visit	Quarterly Visit	Semiannual Visit	Annual Visit
Routine physical exam	**x**	**x**		
Fasting blood sugar (record results of self-monitoring where applicable)	**x**	**x**		
Fasting complete metabolic panel (electrolytes, creatinine, total cholesterol)	**x**			**x**
Fasting Lipid profile *more often if managing a lipid disorder, less often if low risk	**x**			**x**
HBA1C	**x**	**(x)** if treatment changes, or clinically indicated	**x**	
Urinalysis (dipstick)	**x**			**x**
Urine microalbumin	**x** if standard dipstick urinalysis is negative for protein			**x** if standard dipstick urinalysis is negative for protein
Ophthalmologic exam (preferably dilated **)**	**x**			**x**
Fundoscopic exam (performed by primary provider)	**x**	**x**		
Foot Exam: visual monofilament	**x** **x**	**x**		**x** **x**
EKG	**x**			

Fasting or random glucose (finger stick) monitoring - methods and times must be determined on a case-by-case basis depending on the medical needs of the inmate and severity of the condition.

Keys to Diabetes Control

Years ago, the diabetic diet was strict and boring. Today, you do not need special foods; in fact, the foods that are good for you are good for everyone. Diabetes can not be cured, but it can be controlled so that you can lead a normal life and when your diabetes is in good control, complications may be prevented or delayed. There are three keys to controlling diabetes: **1) Diet - weight control or maintenance; 2) Exercise; and 3) Medication - pills or insulin.** All three are equally important. Your food intake and activity needs to balance with your medication for good blood glucose control. By making the proper food choices, exercising, and taking prescribed medication throughout the day, you will be able to maintain a healthy weight and blood glucose control.

Steps to Control Blood Glucose

- **Eat a wide variety of foods every day: Increase high fiber foods such as: grains, beans, vegetables, and fruits to fill you up.**
- **Limit concentrated sweets such as: sugar, honey, jelly, syrup, cakes, cookies, candy, ice cream, pies, pastries, regular soda or kool-ade. Concentrated sugars do not cause diabetes, and do not need to be totally avoided. However, they are concentrated calories - the more calories you eat, the higher your blood glucose.**
- **Limit fats such as: butter, margarine, cheese, fried foods, cream soups, gravy, salad dressings, mayonnaise, and breakfast meats (bacon, sausage, etc.).**
- **Control portion sizes: Too much of even the right foods can also cause high blood glucose. If you want to lose weight, cut down on portion sizes.**
- **Never skip meals: Eat all three meals and include snacks as needed. Eat at about the same time every day.**
- **Exercise: Increase your activity level (as permitted by your doctor). This will decrease your blood glucose level.**
- **Monitor your weight: Weigh yourself only once a week to determine if your diet is effective. If you are overweight, a weight loss of 1-2 pounds per week is a good goal.**
- **Medication: If you take pills or insulin for your diabetes, always take your medication as your doctor has recommended.**

INMATE FACT SHEET
(Diabetes)

1. What is diabetes?

Diabetes is a chronic disease for which there is no cure. It can be controlled by a combination of diet, exercise, and medical care. Diabetes means having too much sugar (glucose) in the blood. In people who have diabetes, sugar builds up in the blood instead of going into the cells.

2. What are the symptoms of diabetes?

Most people with diabetes do not notice any symptoms. However, some symptoms of diabetes are:

- Frequent urination
- Increased thirst and increased hunger
- Unexplained weight loss
- Weakness, fatigue, drowsiness
- Wounds and cuts that heal slowly
- Blurred vision or changes in vision

3. What puts you at risk for diabetes?

- You are age 45 and older
- You are a member of a high-risk ethnic group (African American, Hispanic/Latino, American Indian, Asian American, Pacific Islander)
- You are overweight
- You have high blood pressure (at or above 140/90)
- You have a family history of diabetes
- You have a history of diabetes during pregnancy
- You weighed more than 9 pounds at birth

4. What are the complications of diabetes?

- Eye damage - poor vision, retina damage, cataracts, glaucoma, blindness
- Kidney damage - progressive failure may require hemodialysis or organ transplantation
- Heart problems - damaged blood vessels leading to heart attacks and strokes
- Nerve damage - problems with nerve sensations and moving muscles, loss of reflexes
- Decreased ability to fight infections
- Sores and ulcers of the legs and feet

5. How is diabetes controlled?

Diabetes is controlled by a combination of diet, exercise, and medication. Treatment goals are to keep blood sugar near normal, control blood pressure, lower cholesterol and fat levels, and lose weight or maintain a healthy weight. Research shows that keeping blood sugar as near to normal as possible means fewer complications of the disease. Strict control of blood sugar helps to prevent kidney failure, amputations, blindness, heart attacks, and stroke.

6. What are the symptoms of hypoglycemia (low blood sugar)?

- Shakiness
- Sweating and clammy feeling
- Extreme fatigue
- Hunger
- Rapid heart rate
- Blurred vision

- Irritation or confusion

Resources
(Diabetes)

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) **www.niddk.nih.gov**	**800 860-8747**
National Diabetes Information Clearinghouse **www.niddk.nih.gov/health/diabetes/ndic.htm**	**800-860-8747**
Centers for Disease Control and Prevention **www.cdc.gov/diabetes**	**877 232-3422**
American Diabetes Association **www.diabetes.org**	**800 342-2383**
American Dietetic Association **www.eatright.org**	**800 366-1655**
National Kidney Foundation **www.kidney.org**	**800 622-9010**

PROVIDER SELF-ASSESSMENT
(Management of Diabetes)

1. The optimal test to diagnose diabetes is which of the following?

A. Casual blood glucose
B. Random blood glucose
C. Fasting blood glucose
D. Glucose tolerance test
E. Glycosylated hemoglobin (A1C)

2. A normal plasma fasting blood glucose is defined as which of the following?

A. < 100 mg/dL
B. < 105 mg/dL
C. < 110 mg/dL
D. < 115 mg/dL
E. < 126 mg/dL

3. Diabetes is diagnosed by two plasma fasting blood glucose readings above or equal to which value?

A. ≥ 110 mg/dL
B. ≥ 117 mg/dL
C. ≥ 120 mg/dL
D. ≥ 126 mg/dL
E. ≥ 130 mg/dL

4. Hemoglobin A1C levels are potentially affected by which of the following?

A. Eating chocolate cake the night before testing
B. Running on a treadmill immediately before testing
C. Drinking orange juice immediately before testing
D. The stress of a car accident the week before testing
E. Hemolytic anemia

5. The target A1C level for inmates with diabetes is which of the following?

A. < 9%
B. < 8%
C. < 7%
D. < 6%

6. Which of the following agents can precipitate diabetes/glucose intolerance?

A. Indinavir
B. Pentamidine
C. Risperidone
D. Olanzapine
E. All of the above

7. True or False: Metformin is an excellent choice for treating obese patients with type 2 diabetes, but should not be prescribed if the patient has significant renal insufficiency?

8. Which of the following drug combinations should not be prescribed for type 2 diabetes?

A. Pioglitazone and metformin
B. Glyburide and repaglinide
C. Metformin and glipizide
D. Metformin and insulin
E. Acarbose and glyburide

9. The LDL cholesterol goal for a diabetic patient is which of the following?

A. < 200 mg/dL
B. < 130 mg/dL
C. < 100 mg/dL
D. < 75 mg/dL

10. Adequate blood pressure control for most patients with diabetes is which of the following?

A. < 150/80
B. < 140/95
C. < 140/90
D. < 145/85
E. < 130/80

11. Which of the following statements is false regarding diabetic retinopathy?

A. Type 1 diabetics usually have evidence of retinopathy at initial diagnosis.
B. Type 2 diabetics usually have evidence of retinopathy at initial diagnosis.
C. Patients with retinopathy may be asymptomatic.
D. Poorly controlled glucose is associated with retinopathy.
E. Aspirin does not increase the risk of retinal hemorrhage.

12. A diabetic inmate presents to sick call with nausea, vomiting, and flank pain. He has hematuria and is dehydrated with a random blood glucose of 420. He is on metformin and is otherwise stable. His pain fails to resolve. Your urology consultant recommends IVP. An appropriate next step would be:

A. Hydrate/increase metformin
B. Hydrate/continue metformin/add sliding scale insulin
C. Hydrate/decrease metformin/add insulin
D. Hydrate/discontinue metformin/add sliding scale insulin

13. An inmate stumbles and collapses at mainline waiting for the noon meal. He is clammy and sweaty, incoherent but conscious. You are the first responder and fortunately are his primary care provider. You know that he is a diabetic on insulin and acarbose with a longstanding history of heroin use. A fingerstick glucose confirms hypoglycemia. The Clinical Director arrives and you discuss the most appropriate next step:

A. Grab fruit juice from the chowline and administer orally
B. IV narcan first, if no response give fruit juice
C. Intravenous bolus of glucose (D50)
D. Transfer to community emergency room

14. Which of the following is not routinely indicated for a 50 year old insulin-dependent diabetic with hypertension, proteinuria, and a family history of heart disease?

A. Aspirin
B. Annual influenza vaccine
C. Treatment for latent TB infection if PPD is 10 millimeters
D. ACE inhibitor
E. Beta-blocker

15. Diabetes is associated with which of the following ?

A. Thyroid disease
B. Protease inhibitor therapy for HIV
C. Obesity
D. Native American ethnicity
E. All of the above

PROVIDER SELF-ASSESSMENT ANSWERS
(Management of Diabetes)

1. Answer is C

2. Answer is C

3. Answer is D

4. Answer is E

5. Answer is C

6. Answer is E

7. Answer is TRUE

8. Answer is B

9. Answer is C

10. Answer is E

11. Answer is A
Retinopathy does not usually develop in type 1 diabetics until 5 years after the onset of disease.

12. Answer is D
Metformin can cause severe lactic acidosis in dehydrated patients and should be discontinued 48 hours prior to the use of IV contrast. This acutely ill inmate with poor oral intake is best managed with IV hydration and analgesics, discontinuation of metformin, insulin as needed, and an IVP to evaluate for nephrolithiasis if flank pain is unresolved.

13. Answer is C
The inmate is experiencing a typical hypoglycemic reaction. Oral administration of fruit juice is likely to be ineffective due to the blockage of absorption by acarbose. Intravenous administration of glucose ASAP is warranted, particularly with evidence of altered mental status that suggests a severe hypoglycemic reaction. Other treatment options include parenteral glucagon or oral glucose.

14. Answer is E
Beta-blockers can mask or prolong hypoglycemia and should be avoided in diabetic patients when feasible. Nevertheless, beta-blockers should be given to diabetics who have had a myocardial infarction since it reduces long-term mortality.

15. Answer is E